

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

RECEIVED
CENTRAL FAX CENTER

FEB 26 2008

Amendments to the Claims:

The listing of claims will replace all prior versions and listings of claims in the application:

5 Listing of Claims:

1. (currently amended) An apparatus for performing motion compensation when
decoding an incoming video bit stream including a plurality of frames having
first macroblocks encoded using block-matching motion compensation and
second macroblocks encoded using global motion compensation, the apparatus
10 comprising:

an interpolation unit for performing interpolation operations on each macroblock
contained in each frame of the incoming video stream; and

15 a multiplexer selecting an inputted macroblock motion vector or an inputted
global motion vector and outputting the selected macroblock motion vector
or the selected global motion vector to the interpolation unit;

wherein when processing a current macroblock,

20

if the current macroblock is encoded using block-matching motion
compensation, the interpolation unit performs the interpolation
operations according to the macroblock motion vector; and

25

if the current macroblock is encoded using global motion compensation, the
interpolation unit performs the interpolation operations according to the
global motion vector on a per-macroblock basis.

30

2. (original) The apparatus of claim 1, further comprising a translation unit for
converting global motion parameters associated with a current frame of the

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

incoming video stream into the global motion vector for use by the interpolation unit.

3. (original) The apparatus of claim 2, wherein when processing the current
5 macroblock, if the current macroblock is encoded using block-matching motion compensation, the interpolation unit performs the interpolation operations according to at least one macroblock motion vector contained in the current macroblock.

10 4. (currently amended) The apparatus of claim 3, further comprising:

a block-matching motion vector storage unit for storing the macroblock motion vector extracted from each macroblock encoded using block-matching motion compensation; and

15

a global motion vector storage unit for storing the global motion vector output by the translation unit; ~~and~~

20

~~a multiplexer for selecting whether the interpolation unit uses the macroblock motion vector or the global motion vector;~~

25

wherein when performing the interpolation operations on macroblocks encoded using block-matching motion compensation, the multiplexer outputs the macroblock motion vector stored in the macroblock motion vector storage unit to the interpolation unit, and when performing the interpolation operations on macroblocks encoded using global motion compensation, the multiplexer outputs the global motion vector stored in the global motion vector storage unit to the interpolation unit.

30 5. (original) The apparatus of claim 1, wherein the interpolation operations

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

comprise luminance and chrominance interpolation operations.

- 5 6. (original) The apparatus of claim 5, wherein when performing the luminance interpolation operations on macroblocks encoded using block-matching motion compensation, the interpolation unit uses half-pel precision.
- 10 7. (original) The apparatus of claim 5, wherein when performing the chrominance interpolation operations on macroblocks encoded using block-matching motion compensation, the interpolation unit uses half-pel precision.
- 15 8. (original) The apparatus of claim 5, wherein when performing the luminance interpolation operations on macroblocks encoded using global motion compensation, the interpolation unit uses half-pel precision.
- 20 9. (previously presented) The apparatus of claim 5, wherein when performing the chrominance interpolation operations on macroblocks encoded using global motion compensation, the interpolation unit uses quarter-pel precision.
- 25 10. (original) The apparatus of claim 1, wherein the video decoder is capable of processing an incoming MPEG-4 video stream.
- 30 11. (previously presented) The apparatus of claim 10, wherein the video decoder is for processing only an incoming MPEG-4 video stream having a no_of_sprite_warping_point parameter set to either 0 or 1.
12. (original) The apparatus of claim 1, wherein when performing the interpolation operations, the interpolation unit uses a bilinear interpolation process.
13. (currently amended) A method of processing an incoming video bit stream comprising a plurality of frames, the plurality of frames including first

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

macroblocks encoded using block-matching motion compensation and second macroblocks encoded using global motion compensation, the video bit stream including macroblock motion vectors indicating motion vectors of the first macroblocks and global motion parameters associated with the plurality of frames indicating a motion vector of each pixel in the second macroblocks, the method comprising:

if a current macroblock is encoded using block-matching motion compensation, utilizing an interpolation unit to perform the interpolation operations according to macroblock motion vector, and

if a current macroblock is encoded using global motion compensation, performing utilizing the interpolation unit to perform the interpolation operations according to a global motion vector which is derived from the video bit stream and is in a form substantially identical to that of the macroblock motion vector.

14. (original) The method of claim 13, further comprising converting global motion parameters associated with a current frame of the incoming video stream into the global motion vector.

15. (original) The method of claim 13, further comprising if the current macroblock is encoded using block-matching motion compensation, performing the interpolation operations according to a macroblock motion vector contained in the current macroblock.

16. (original) The method of claim 13, wherein the interpolation operations comprise luminance and chrominance interpolation operations.

17. (original) The method of claim 16, wherein when performing the luminance

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

interpolation operations on macroblocks encoded using block-matching motion compensation, using half-pel precision.

18. (original) The method of claim 16, wherein when performing the chrominance
5 interpolation operations on macroblocks encoded using block-matching motion compensation, using half-pel precision.

19. (original) The method of claim 16, wherein when performing the luminance
10 interpolation operations on macroblocks encoded using global motion compensation, using half-pel precision.

20. (previously presented) The method of claim 16, wherein when performing the
15 chrominance interpolation operations on macroblocks encoded using global motion compensation, using quarter-pel precision.

21. (original) The method of claim 13, wherein the method is capable of processing
an incoming MPEG-4 video stream.

22. (previously presented) The method of claim 13, wherein the method is for
20 processing only an incoming MPEG-4 video stream having a no_of_sprite_warping_point parameter set to either 0 or 1.

23. (original) The method of claim 13, wherein when performing the interpolation
25 operations, using a bilinear interpolation process.

24. (currently amended) A predicted image synthesizer in a video decoder for
decoding a video bit stream and generating a predicted image, the video bit
stream including a plurality of frames having first macroblocks encoded using
block-matching compensation and second macroblocks encoded using global
30 motion compensation, the video bit stream including macroblock motion vectors

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

indicating motion vectors of the first macroblocks and global motion parameters associated with the plurality of frames indicating a motion vector of each pixel in the second macroblocks, the predicted image synthesizer comprising:

5

a translation unit receiving the global motion parameters, and translating the global motion parameters into a global motion vector which is in a form substantially identical to that of the macroblock motion vector,

10

a multiplexer selecting an inputted macroblock motion vector or the inputted global motion vector which is in a form substantially identical to that of the macroblock motion vector and outputting the selected macroblock motion vector or the selected global motion vector which is in a form substantially identical to that of the macroblock motion vector; and

15

[[a]] an interpolation unit for receiving a decoded image which is a previously decoded frame, receiving the ~~global motion vector~~ the selected macroblock motion vector or the selected global motion vector which is in a form substantially identical to that of the macroblock motion vector outputted by the multiplexer, performing interpolation operations, and generating the prediction image.

20

25

25. (original) The predicted image synthesizer of claim 24, further comprising a demultiplexer receiving the macroblock motion vectors and global motion parameters, and respectively outputting the macroblock motion vectors and the global motion parameters, the global motion parameters are sent to the translation unit and translated into a global motion vector which is in a form substantially identical to that of the macroblock motion vector, and the interpolation unit selectively receiving the macroblock motion vector or the

30

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

global motion vector to perform the interpolation operations.

26. (original) The predicted image synthesizer of claim 25, wherein the interpolation
unit receives the global motion vector when a current macroblock is encoded
5 using global motion compensation.

27. (original) The predicted image synthesizer of claim 25, wherein the interpolation
operations include a luminance interpolation operation and a chrominance
interpolation operation, the interpolation unit uses a first resolution to perform
10 the luminance interpolation operation and uses a second resolution to perform
the chrominance interpolation operation.

28. (original) The predicted image synthesizer of claim 27, wherein the first
resolution is a half-pel resolution, and the second resolution is a quarter-pel
15 resolution.

29. (original) The predicted image synthesizer of claim 25, wherein the interpolation
unit receives the macroblock motion vector when a current macroblock is
encoded using block-matching motion compensation.
20

30. (original) The predicted image synthesizer of claim 29, wherein the interpolation
operations include a luminance interpolation operation and a chrominance
interpolation operation, and the interpolation unit uses a half-pel resolution to
perform both the luminance interpolation operation and the chrominance
25 interpolation operation.

31. (original) The predicted image synthesizer of claim 30, wherein when performing
the interpolation operations, the interpolation unit uses a bilinear interpolation
process.
30

Appl. No. 10/605,882
Reply to Office action of January 31, 2008

32. (previously presented) The method of claim 13, further comprising performing the interpolation operations according to the global motion vector on a per-macroblock basis when the current macroblock is encoded using global motion compensation.

5

33. (previously presented) The predicted image synthesizer of claim 24, wherein the interpolation unit is further for performing the interpolation operations according to the global motion vector on a per-macroblock basis when the current macroblock is encoded using global motion compensation.

10

34. (previously presented) The predicted image synthesizer of claim 24, wherein the video decoder is for processing only an incoming MPEG-4 video stream having a no_of_sprite_warping_point parameter set to either 0 or 1.

15